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ABSTRACT

Two experiments involving 105 undergraduates tested acquisition of knowledge from newspaper stories. Subjects studied either an actual newspaper story or an altered form of the story constructed by deleting the irrelevant and redundant information and restricting the remaining information into either a narrative, topical, or outline form. Presentation of any of the condensed versions of the story led to better recall than presentation of the entire news story. However, none of the structural reorganizations of the text information led to consistently superior recall relative to a passage that deleted the irrelevant information but maintained the story structure. These results contradict the theory that supposes a single, universal schema underlies the representation of all passages in human memory. (Author/FL)

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Knowledge Acquisition from Newspaper Stories[1]

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Rand Corporation

December 1977

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The influence of text organizations on the acquisition of information from the texts has received extensive treatment by educational and cognitive psychologists. In some studies, the investigators identify for subjects the learning objectives; that is, the subset of text information to be sought and learned. In such cases, subjects learn the target information better if all sentences relevant to a particular learning objective are grouped together rather than distributed throughout the passage (Gagne & Rothkopf, 1975). More typically, however, a reader attempts to learn all information in the passage, since he does not know what particular facts will be of use later. In such cases, the structure of the material is a critical determinant of what will be learned from the passage. In general, familiarity with the structure of the material, independent of its semantic content, can facilitate learning of the material (Thorndyke, 1977). In that study, subjects who were primed with the narrative structure of a to-be-learned text (i.e., abstract text-level knowledge about the organization of events into higher-level episodes within the passage) had significantly better recall for the passage than subjects who were primed with an irrelevant structure.

Several studies have investigated the efficacy of various information organizations for text learning. In a series of related studies (Frase, 1969b, 1973; Friedman & Greitzer, 1972; Myers, Pezdek, & Coulson, 1973; Perlmutter & Royer, 1973; Schultz & DiVesta, 1972) text passages were constructed from matrices of name-attribute-value triples. That is, a set of concepts in a

semantic category were described using a fixed set of attributes, and each concept in the category had different values of the attribute. In general, these studies demonstrated that any coherent organization of the information (i.e., either by names or by attributes) produced better learning than a random organization. While name organization was a preferred or dominant learning strategy, attribute organization could be adopted if the to-be-learned texts were so structured. Interestingly, the two organizations seem to produce equal learning of the material. Therefore, while subjects seem to retain the organization of information at input, some organizations are preferred for learning than others. It is unclear why the preferred organization does not produce better learning of the material. One reason may be that the passages in these studies were either sufficiently short or simple that any reasonable organization, even a less preferred one, could produce benefits for memory and recall. Another possibility is that the two alternative organizations are equivalent in their ability as memory organizers. The name organization might reflect merely a preferred output order, but not provide an advantage in storage or retrieval of the encoded information.

The materials used in these studies were from a very restricted class of texts, one that rarely appears in naturalistic learning environments. The test passages concerned a small, fixed set of exemplars from a single conceptual category, each one of which possessed different values for a particular set of attributes. More typically, a text that

someone has to learn contains information about multiple topics, has a wide variety of predications about those topics, and contains events or actions with a temporal structure. Depending on the author's intention and point of view, a text is usually organized either topically, with information organized around conceptual themes, or temporally, with information presented in a narrative sequence. These two organizations might have very different consequences for how well a passage can be learned, particularly if, as in the studies discussed above, one of the organizations is preferred by readers.

In studies of the effects of these two forms of organization on learning (Sasson, 1971; Kulhavy, Schmid, & Walker, 1977), conceptual organization was superior to temporal organization of information. In the former study, however, the texts were presented to subjects one word at a time in serial order. This procedure bears little resemblance to the way in which people normally study and learn texts, so conclusions from this study regarding normal processing modes must be regarded as tenuous. In the latter study, only recall of a few target words was measured, so it is difficult to assess the effect of the organization manipulation on overall learning of a coherent prose passage.

In an attempt to precisely model the organization of textual information in memory, several researchers have proposed detailed representations for the structure in a prose passage (Kintsch, 1974; Meyer, 1975; Rumelhart, 1975; Frederiksen, 1975; Thorndyke, 1977; Mandler & Johnson, 1977). Various predictions of these

models for the influence of structure on acquisition and retention of information have been tested empirically. A typical finding is that the "centrality" or "importance" of a proposition to the "theme" of the passage predicts the recall probability of the proposition (Kintsch, 1974; Meyer, 1975; Thorndyke, 1977). From these and other studies a general theory of "schemata" has emerged (Anderson, 1977; Rumelhart & Ortony, 1977; Thorndyke, 1978). This theory assumes that a person has in memory a set of prototypical structures for use in comprehending and encoding prose information, particularly goal-directed narrative sequences. In cases in which these schemata have been specified in detail, the text domains to which the schemata apply have been relatively narrow. Thus the generality of particular schemata has not been determined. It is unclear, for example, whether a particular structure or schema is optimal for learning all narrative texts, or whether numerous schemata are available to be used depending on subtle attributes of the to-be-learned texts. Thus, as in the name-attribute-value studies discussed above, the question of whether particular schemata can be identified as optimal for learning is still unresolved.

The present study attempted to assess the overall effect of various information organizations on the learning of meaningful, naturalistic texts, and to determine if an optimal organization could be identified. The source of materials for the experimental stimuli was newspaper stories. Several current events and feature stories were selected from the New York Times and Los Angeles Times to serve as fact bases to be learned by

subjects. The newspaper was used as a text source for several reasons. First, news stories provide a naturalistic processing environment for people, since they are frequently read and used as a reliable information source. They represent a wide diversity of topics and types of information, so they are unbiased with respect to any particular knowledge organization. That is, there is no a priori reason to expect one type of knowledge organization to be superior to any other on the basis of the information content of the stories. In addition, news stories appear already organized in a standard, familiar format, so the utility of that format for learning can be contrasted with other experimentally-imposed organizations. The standard structure of news stories--the presentation of "important" or "timely" information in the first paragraph and the elaboration of details and background in subsequent paragraphs--is based on conventions of journalistic style. Important information is presented first so that it will catch the reader's eye and be assimilated at a quick glance. Information is presented in generally decreasing order of importance so that if the story needs to be cut to fit a particular space on the page, that which is cut out will be less important than what is left in. Thus, the organization of the news story is dictated by the particular requirements of that medium. However, this structure may not be optimal for the learner who is attempting to acquire all the facts in the passage. News stories present events out of their normal time sequence and utilize repetition and redundancy in order to establish referential connections among facts that are

related but are widely separated in the story. Thus, while certain goals of the newspaper editor are met, they might come at the expense of the overall learnability of the material. In the present paper, the efficacy of alternative knowledge organizations for learning are assessed. Experiment 1 used a free recall task to assess the learning of information from news stories organized in different formats. In addition, measures of reading time for each passage were taken in each organizational format to provide some indication of the readability of each organization.

EXPERIMENT 1

METHOD

Materials. Four newspaper articles from the Los Angeles and New York Times were selected for use as materials. Each article described a set of events that occurred over a period of time and background information relevant to those events. The text of one such story is provided below as an illustration of the NEWS organization.

Iraq: News Story

Despite having the second largest oil reserves in the Middle East, Iraq today find itself short of cash.

Civilization was cradled between its Tigris and Euphrates rivers, and the site of ancient Babylon's splendor lies 50 miles south of Bagdad.

Yet the majority of Iraq's people were illiterate as late as 1973.

Oil revenues have increased massively in recent years, but only a small minority have benefited, in contrast to other petroleum-producing Arab lands where spread-the-wealth has been a byword.

"Our problem is management...management from top to botton," said Dr. Hashim Jawad, a top planning advisor to Iraq's Revolutionary Command Council.

Iraq once was a sleepy, British-oriented monarchy.

Red double-decker buses still churn through Bagdad's crowded streets, and what remains of the old privileged class still gathers for tea or tennis at the Alwiyah Club.

To this has been added the trappings of the turbulent post-revolutionary era, such as the splendid arch which is a monument to Iraq's unknown soldier, and a still-unfinished luxury hotel.

Many projects such as this have been halted in midstream and others postponed because of the lack of cash.

Iraq has an estimated shortage of $600 million in oil revenues this year, out of a total expected income of around $8 billion.

When the Basrah Petroleum Co., the last remaining Iraqi oil firm which still had foreign participation, was fully nationalized last spring, the former parent companies halted their purchase of oil.

Gradually they have been coming back, with Shell and the French Petroleum Co. the first to resume.

Last April, Iraq suddenly cut off all oil shipments to Mediterranean ports via a trans-Syrian pipeline.

Early this year, another pipeline to the Mediterranean, which bypasses Syria and ends up in Turkey, is scheduled to become operational.

This should fully make up for the capacity lost by shutting down the trans-Syrian pipeline.

The present set of rulers here is the third since the 1958 revolution which ended the monarchy.

That revolution set the country off on a new course, vaguely socialistic and strongly Arab nationalist.

The Soviet Union is now Iraq's major friend, and Zionism is the enemy.

A lack of manpower and skilled technology is the major problem.

This story concerns the declining oil revenues of Iraq, its causes, and the prospects for the future. However, many of the sentences in the story are either tangential or irrelevant to this theme. In addition, some of the sentences are repetitions or elaborations of information already presented earlier. A second version of this NEWS organization, called the CONDENSED organization, was constructed. The CONDENSED organization of each of the four newspaper stories was derived from the NEWS passages by deleting certain information from the NEWS passages. Deleted information was one of three types: 1) repetition or elaboration of previously presented information, 2) background information that was irrelevant or tangential to the main point of the story, or 3) extraneous commentary on the events of the story either by the reporter or by another observer. Thus the important information from the story was preserved while the unimportant information was eliminated. The serial position of the remaining sentences in the story was not altered. A portion of the CONDENSED version of the Iraq story is given below.

Iraq: CONDENSED Version

Despite having the second largest oil reserves in the Middle East, Iraq today finds itself short of cash.

Iraq once was a sleepy, British-oriented monarchy.

Iraq has an estimated shortage of $600 million in oil revenues this year, out of a total expected income of around $8 billion.

When the Basrah Petroleum Co., the last remaining oil firm which still had foreign participation, was fully nationalized last spring, the former parent companies halted their purchase of oil.

Gradually they have been coming back, with Shell and the French Petroleum Co. the first to resume.

Last April, Iraq suddenly cut off all oil shipments to Mediterranean ports via a trans-Syrian pipeline....

The CONDENSED version of each news article was used to create all of the other organizations used in Experiments 1 and 2. One of these, the NARRATIVE version, was constructed by rearranging the sentences in the CONDENSED organization into a chronological sequence. Thus this passage preserved a temporal continuity in the presentation of the story's events. A portion of the NARRATIVE version of the Iraq news story is presented below.

Iraq: NARRATIVE Version

Iraq once was a sleepy, British-oriented monarchy.

The present set of rulers here is the third since the 1958 revolution which ended the monarchy.

That revolution set the country off on a new course, vaguely socialistic and strongly Arab nationalist.

The Soviet Union is now Iraq's major foreign friend, and Zionism the enemy.

Iraq has the second largest oil reserves in the Middle East.

Last Spring, the Basrah Petroleum Co., the last remaining Iraqi oil firm which still had foreign participation, was fully nationalized.

As a result, the former parent companies halted their purchase of oil.

Gradually, they have been coming back, with Shell and the French Petroleum Co. the first to resume.

Then last April, Iraq suddenly cut off all oil shipments to Mediterranean ports via a trans-Syrian pipeline...

Finally, a TOPICAL version of each story was constructed by organizing the sentences from the CONDENSED version under topical

subheadings. A portion of the TOPICAL passage is presented below.

Iraq: TOPICAL Version

Oil Economy

Despite having the second largest oil reserves in the Middle East, Iraq today finds itself short of cash.

Iraq has an estimated shortage of $600 million in oil revenues this year, out of a total expected income of around $8 billion....

History

Iraq was once a sleepy, British-oriented monarchy.

When the Basrah Petroleum Co., the last remaining oil firm which still had foreign participation, was fully nationalized last spring, the former parent companies halted their purchase of oil....

Politics

Last April, Iraq suddenly cut off all oil shipments to Mediterranean ports via a trans-Syrian pipeline.

This action served as an Iraqi protest of Syrian military intervention in the Lebanese civil war.

Subjects. The subjects were 60 UCLA undergraduates. They participated in the 90-minute experiment either to satisfy a course requirement or for $5.00 pay.

Design. A within-subject design was used. There were four conditions of story organization--NEWS, CONDENSED, NARRATIVE, and TOPICAL. Each subject received one passage in each of the four organizations. The four topic stories were entitled Iraq (the story presented above), The Release of Carrillo (concerning the prison release of the Spanish Communist Party leader), Wehrner Von Braun (concerning the career of the rocket scientist), and

Burundi (concerning the civil war in the African country). The assignment of stories to each organization condition was counterbalanced across subjects. The dependent variables were reading time and free recall of story propositions.

Procedure. Subjects were tested singly or in small groups. Subjects were given booklets containing the stories, one story per page. They were instructed to carefully read the passages because they would be asked questions about them later. They were instructed to read each passage only once, and were not allowed to look back to previous stories. Each subject would read a story at a self-paced rate, and then record the amount of time it took to read the story. Immediately after reading the story, subjects were instructed to write the passage as close to verbatim as possible, exactly as it appeared in wording and sentence order. However, subjects were told not to omit anything from their recalls that they remembered simply because they could not recall its exact wording or serial position in the passage. Recalls were written on a blank sheet of paper. Unlimited recall time was provided. This read-recall procedure was repeated for each of the four stories.

RESULTS AND DISCUSSION

In order to analyze the reading times and the recall protocols, each passage was segmented into propositions. A proposition was defined as a clause or sentence which contained an action or stative verb. Recall protocols were scored for gist reproduction of the propositions. A proposition was scored as

having been correctly recalled if the relation or action in the proposition was recalled or paraphrased correctly. This procedure has been used previously to score text recall protocols and is reliable across independent judges (Thorndyke, 1977).

The data were analyzed using a two-way analysis of variance that treated both text structure and materials (story topic) as main factors. Since there was no significant interaction between structure and materials for either reading time or recall, the data were collapsed across the different story topics within each structure condition.

Reading Time

The mean reading times for each of the structure conditions are shown in the first row of Table 1. Mean reading time for the original news stories was the longest (157.6 sec.), while reading time for the other three structures was nearly equal. The effect of story organization on reading time was significant, $F(3, 172)=19.01$, $p<.01$. Newman-Keuls tests were used to perform pairwise comparisons between the means. Reading time was significantly faster for the three other organizations than for the NEWS organization ($p<.01$ for NARRATIVE and CONDENSED; $p<.05$ for TOPICAL). No other pairwise differences were significant. That the reading time for the NEWS passages was the longest was not surprising, since these passages contained more propositions than those in the other three conditions.

Table 1

Reading Times and Recall Percentages for the Text Organizations in Experiment 1

Factor	Structure Type			
	NEWS	CONDENSED NEWS	NARRATIVE	TOPICAL
Reading time (sec)	157.6	114.3	108.9	122.1
Reading time per proposition (sec)	2.10	2.21	2.12	2.41
Free Recall (%)	18.8	25.5	24.7	24.9

To correct the reading times for the differences in passage length, each reading time was normalized by dividing it by the number of propositions in the passage. Thus for each condition, a mean reading time per proposition was obtained. These data are shown in the second row of Table 1. Mean reading time per proposition was actually fastest in the NEWS condition, followed by the NARRATIVE, CONDENSED, and TOPICAL conditions. This result was significant, $F(3, 172) = 3.16$, $p < .05$. The NEWS reading time was significantly faster than the TOPICAL reading time (Newman-Keuls, $p < .05$). Again, however, the CONDENSED condition and the structural transformations on the CONDENSED condition (NARRATIVE and TOPICAL) did not differ from one another on mean reading time.

Free Recall

The results for the free recall task are presented in the third row of Table 1. For each text organization condition, the

mean percentage of propositions recalled across the four passages is given in the table. Recall was lowest for the NEWS organization, and higher and approximately equal for the other three organizations. The effect of organization on recall was significant, $F(3, 224) = 2.72$, $p < .05$. Newman-Keuls tests declared the mean for the NEWS condition to be significantly lower than the mean for each of the other conditions ($p < .05$ for all three pairwise comparisons). The CONDENSED, NARRATIVE, and TOPICAL conditions did not differ reliably. It may be noted that while these three organizations all contained identical passage content, the NEWS passages contained additional propositions not included in the other organizations. Therefore, not only were the NEWS texts longer, but the to-be-recalled information in this condition was not identical to the other three conditions. Consequently, the analysis of the recall data was recomputed using for the NEWS condition only those propositions that occurred in the other organization conditions. When only this subset of the NEWS propositions was considered, recall for this condition was 22.0%. Using this scoring metric, the overall effect of organization was not significant, $F(3, 224) = .78$. However, a planned comparison revealed that the mean for the NEWS condition was reliably lower than the combined mean for the other conditions, $t(224) = 9.60$, $p < .001$.

The fact that recall of the NEWS passages was lower when the extraneous NEWS propositions were scored than when they were not suggests that these propositions were not well recalled. A separate analysis was performed to compare mean percentage free

recall within the NEWS organization for those propositions that occurred only in the NEWS passages (i.e., the propositions that were deleted to create the CONDENSED organization) versus those propositions that occurred in all organizations. Overall, mean recall of the former propositions was 12.0%, while recall of the latter was 22.0%. This difference was significant, $t(59) = 5.42$, $p < .001$.

The finding that the extraneous NEWS propositions were recalled worse than those used in the CONDENSED condition is consistent with the hypothesis that these extraneous propositions were not central to the theme of the passage. When reading the NEWS passages, subjects presumably evaluated the "importance" or "centrality" of each proposition with respect to the main theme of the story. Those that were tangential or unimportant were not processed as deeply or as carefully as the more important propositions, and hence were not learned as well. This effect of propositional importance on recall has been obtained on a variety of prose materials (Kintsch, 1974; Meyer, 1975; Thorndyke, 1977).

This analysis may also be used to explain the obtained reading time results. While recall was worst for the NEWS condition, the reading time per proposition for this condition was the fastest. It is particularly surprising that the mean propositional reading time for the NEWS condition (2.10 sec) was faster than for the CONDENSED condition (2.21 sec), since this latter condition was identical to the NEWS condition except for the absence of the deleted extraneous NEWS propositions. A possible explanation for this difference in reading time is that

the extraneous propositions in the NEWS condition were scanned faster than those propositions that were common to the two conditions. Since subjects were reading to learn the passages, proposition "scanning" time includes reading time, comprehension time, and time for elaborative processing for encoding in memory. If subjects identified the extraneous propositions as irrelevant or tangential to the theme of the passage, they could process these propositions more superficially than the more important ones. Such superficial processing would require less time than deeper processing. If the propositions common to the NEWS and CONDENSED conditions were processed at the same rate in the two conditions, while the extraneous propositions in the NEWS condition were processed faster, then the mean reading time per proposition in the NEWS condition would be faster. This was the result that was, in fact, obtained. While this hypothesis is consistent with the recall results for these extraneous propositions, a direct test of this hypothesis was not possible in the present design.

While all structural transformations on the NEWS passages led to improved recall performance, neither the NARRATIVE nor the TOPICAL passages were read faster nor recalled better than the CONDENSED passages. This result suggests that neither organization provided a preferred, familiar schema that could be used to guide comprehension and encoding of the facts embedded in those structures. Experiment 2 investigated whether this result could be replicated with another performance measure, question-answering, and with another organizational format.

EXPERIMENT 2

The design of Experiment 2 was similar to that of Experiment 1 except that the NEWS and TOPICAL organizations were deleted and an OUTLINE organization was added. The OUTLINE organization was created by reorganizing the material in the CONDENSED organization into an outline format. The organization of the outline was based upon the chunking of events into episodes according to temporal and causal associations among the events. An episode thus consisted of a set of events and their consequences that were causally and topically related and that occurred together in time. The episodes were ordered chronologically. This organization is similar to that found in several psychological models of narrative story memory (Rumelhart, 1975; Thorndyke, 1977; Mandler & Johnson, 1977). In the present experiment, however, this organization was made explicit by presenting the information in the physical layout of an outline. Information was spatially arranged on the page using indentations to accentuate the hierarchical nature of the organization, explicit labels (e.g., Background, Episode 1, etc.) were given to section headings, and the text from which the outline was derived (the CONDENSED passage) was abbreviated so as to be amenable to the outline format. This alteration of the text itself required a certain amount of syntactic reduction of the sentences from the CONDENSED organization. However, no semantic alterations to the information were made. A portion of the OUTLINE organization for the Iraq text is presented below.

Iraq: OUTLINE Organization

BACKGROUND

Iraq — Was a sleepy, British-oriented monarchy

CHRONOLOGY

Episode 1: 1958

Event: Revolution ended the monarchy

Result: Country set off on a new course,
vaguely socialist
and strongly Arab nationalist....

Episode 2: Last spring

Event: The Basrah Petroleum Co.,
the last remaining Iraqi oil firm
which still had foreign participation
was fully nationalized.

Result: Former parent companies halted purchase of
oil....

Episode 3: Last April

Event: Syria intervened militarily in the Lebanese
civil war.

Result: Iraq cut off oil shipments
to Mediterranean ports
via a trans-Syrian pipeline....

METHOD

Subjects. The subjects were 45 undergraduates at UCLA who participated in the experiment to satisfy a course requirement.

Design. A within-subjects design was used. There were three conditions of passage organization--CONDENSED, OUTLINE, and NARRATIVE. Three of the topic passages from Experiment 1 were used as materials (Iraq, Burundi, and The Release of Carrillo). Each passage had three versions, one for each of the different organization conditions. Each subject received for study and

test a passage in each of the three organizations. The assignment of story topic to organization was counterbalanced across subjects, as was the serial position of presentation of each organization.

There were two dependent variables. The first was free recall of the entire passage, as in Experiment 1. The second was question-answering performance. For each passage, a set of 12 questions were constructed whose answers depended upon retrieving a particular detail from the passage. Answering the questions correctly required only retrieval of explicitly presented facts; no inferential processes were required. For example, one such question for the Iraq passages was "What is Iraq's major national problem?"

Procedure. Subjects were tested singly or in small groups. They were instructed to attend carefully to the passages because they would be required to recall them later. They were permitted to read each passage only once, and could not look back to previous passages. After reading all three passages, subjects performed the free recall task. Recall instructions identical to those in Experiment 1 were given. Order of recall of the passages was the same as the presentation order.

The question-answering test immediately followed the free recall test. Subjects were instructed to answer the questions as well as they could using the information they could recall from the story. Twelve questions or sentence completions were presented for each story. Questions from each story were listed on separate pages, and test order for the passages was the same

as presentation order. Unlimited time for answering questions was provided.

RESULTS AND DISCUSSION

The same procedure described in Experiment 1 was used to score the recall protocols. The mean percentage free recall and questions correctly answered were computed for each story in each of the three organizations. These data were analyzed separately using a two-way analysis of variance that treated both stories and structure conditions as main effects. The data are shown in Table 2.

The pattern of results was similar for free recall and question answering. Across subjects, there was a significant correlation between recall of a passage and the percent of questions correctly answered, $r = .62$, $t(133) = 9.11$, $p < .001$. For free recall, mean performance was 22.3% for the CONDENSED condition, 26.0% for the NARRATIVE condition, and 22.0% for the OUTLINE condition. These differences were not significant. However, there was a significant story by structure interaction $F(4,126)=2.50$, $p<.05$. For the question answering task, mean percent correct was 34.7 for the CONDENSED condition, 36.7 for the NARRATIVE condition, and 39.7 for the OUTLINE condition. Again, the results due to organization were not reliable, but the story by organization interaction was significant, $F(4,126)=3.27$, $p<.05$.

Table 2

Free Recall and Question-Answering Percentages for the Text Organizations and Stories in Experiment 2

	Structure Type					
	CONDENSED NEWS		NARRATIVE		OUTLINE	
Story	FR[a]	QA[b]	FR	QA	FR	QA
Iraq	23	36	33	52	24	42
Burundi	17	28	26	34	23	44
Carrillo	27	40	19	24	19	33
Mean	22.3	34.7	26.0	36.7	22.0	39.7

[a] Free Recall

[b] Question Answering

As in Experiment 1, none of the organizations was consistently superior for learning of the text information across stories. In fact, the interaction obtained here for both free recall and question answering suggests that different organizations were optimal for different stories. An examination of the news stories used as materials in Experiment 2 revealed an obvious distinction among them. Both the Iraq and Burundi stories were essentially background or feature articles. They both contained a narrative chronology that provided an historical perspective for viewing the present social and political situation in the countries. Neither article contained any current, newsworthy events, but rather focused on a broad history

of events. For these stories, then, comprehension of the narrative sequence of events was critical to the theme of the passages. It is reasonable to presume, then, that a presentation structure organized around the narrative chronology would facilitate learning of the text.

The Carrillo story, on the other hand, was a more typical current events story. The story centered around a single event, the release of Carrillo from prison, and the multiple consequences of that event. In this story, there was much less narrative history than in the other stories. Rather, the emphasis was on the implications in the present and in the future of the single, important action. For this story, then, a structure that emphasized the main event and its direct consequences and deemphasized the background narrative might be preferable for learning.

The ability of these hypotheses to explain the obtained interaction between structure and story was tested by computing post hoc comparisons on the means in Table 2. If a narrative structure was optimal for learning of the Iraq and Burundi stories, then free recall and question answering performance for the NARRATIVE and OUTLINE conditions should be better than for the CONDENSED conditions. For the Burundi story, the combined mean of the NARRATIVE and OUTLINE conditions was reliably greater than for the CONDENSED condition for both free recall and question answering ($p < .05$ for both). For the Iraq story, the combined NARRATIVE and OUTLINE mean for question answering was greater than for the CONDENSED condition ($p < .05$). The

comparison of free recall performance demonstrated the same trend, but failed to achieve significance ($p < .10$).

For the Carrillo story, the hypotheses given above make the opposite prediction. That is, the CONDENSED structure, with its emphasis on the current event and situations of the story, should be superior to the NARRATIVE and OUTLINE conditions for learning. The same comparisons performed for the other stories confirmed this hypothesis. For both free recall and question answering, performance in the CONDENSED condition was greater than for the combined NARRATIVE and OUTLINE conditions ($p < .05$ for both).

GENERAL DISCUSSION

The results obtained here indicate that newspaper stories contain a considerable amount of information that is of little relevance to the reader and to the main theme of the story. A significant portion of this extraneous information is repetition of previously stated information that is necessary to establish referential identity for some new information to be presented. This repetition presumably facilitates comprehension by facilitating the integration of the new information with previously stated, or "given" information, as suggested by Haviland & Clark (1974). Since a newspaper story employs frequent topical shifts among the set of topics treated by the story, much repetition of information is required to identify the changing contexts and identify the referents for the new information to come. Other extraneous information in news stories includes incidental background information or commentary

that is only tangentially related to the main point of the story. The recall data from Experiment 1 indicate that none of this extraneous information is well learned relative to the more theme-relevant information in the story. The reading time data also suggest the possibility that this information is not processed as carefully as the more theme-relevant information. These results are consistent with the general finding in prose studies that people are more likely to learn and remember the important ideas (those central to the theme of the passage) than the unimportant ideas (Meyer, 1975; Thorndyke, 1977; Pichert & Anderson, 1977).

The recall data in the two experiments presented here complement previous work on the effects of various organizations on learning textual material. In previous studies using texts describing the values of various attributes for a set of concepts, no clear organization emerged as optimal for learning. In the present study, texts with more substantial variation in content were used as materials. The to-be-learned information contained varying amounts of narrative history supported by background information and discussion of the consequences of the historical events. While all the passages used as materials in this study shared this general narrative form, no single organization was found to be optimal for presenting the information in all texts.

These results argue against the existence of a single, universal schema for representing all narrative texts. The notion of a schema, as it applies to the representation of prose

information, is generally interpreted to be an abstract framework or description of how narrative information can be combined to produce meaningful stories. A text schema, then, provides a set of constraints on how events and their consequences can be combined to produce meaningful episodes, and how a set of episodes, in turn, can be combined so they lead to a reasonable conclusion or resolution of the story. In this very general formulation, text schemata have been proposed to describe the structure of a story independent of its semantic content (Rumelhart, 1975; Thorndyke, 1977). When a person reads a story, he presumably uses his stored schema to guide the comprehension of the story by imposing the constraints of the schema on the interpretation of the incoming information. When a story fits the stored schema, comprehension and retention are facilitated by the organizational and integrative benefits provided by the schema.

In the present study, however, no single organization of information was optimal for all stories. In fact, different organizations were most effective with different stories. When the story contained a narrative chronology, the organizations that emphasized the causal and temporal associations among events produced the best learning. These organizations were suggested by earlier work on schemata for narrative stories (Rumelhart, 1975; Thorndyke, 1977; Mandler & Johnson, 1977). However, when the to-be-learned story focused on a single event and its consequences, the newspaper format was superior to the narrative format as a text organization. The inability to find a

consistently superior organizational form suggests one of two conclusions. Either there are no real schemata that can characterize the organization of text information, or there must exist several (or many) schemata that a person can effectively use, depending on the nature of the to-be-learned information. The first conclusion seems unwarranted in light of numerous studies that indicate people have no difficulty distinguishing between stories with well-formed narrative structures and those in which normal conventions of causal and narrative organization are violated (e.g., Thorndyke, 1977; Kintsch, Mandel, & Kozminsky, 1977). While these results do not prove the existence of schemata, theories based on such structures currently provide the best theoretical account for people's ability to recognize well-formed stories. Therefore, it would seem premature to argue against schema theory on the basis of negative results from a single study.

The more reasonable conclusion from these data would seem to be that people have available a set of schemata for text organization that can be used as the content of the text warrants. For example, if the narrative information in a story is only incidental to the main point or conclusion of the story, then a narrative schema, in which the events are assumed to lead up to and support the conclusion, may not be appropriate for encoding the story. The main point, or focus, of the story would thus be central in determining the appropriate schema for encoding the story information. In current events news stories, the main point is identified by its placement in the first

sentence or paragraph of the story. On the other hand, in many stories the focus of the story depends on the perspective of the reader. Given different perspectives on a story, different information might emerge as being central or important in development of the theme. Other researchers have begun to note circumstances in which alternative schemata may be applied to the comprehension of a story depending on the perspective taken by the reader (Pichert & Anderson, 1977; Kozminsky, 1977). In these studies, the information retained from a passage by a reader could be influenced by biases in perspective on the passage introduced by the experimenter. These studies give credence to the notion that multiple schemata are available for use in encoding story information. For the "multiple schema" notion to be a useful and viable theory, it must be demonstrated that there are many fewer schemata than there are possible stories. That is, while there may be multiple schemata that can be used to encode story information, each one of them must be capable of representing numerous texts of its type. If the set of schemata is unable to reduce the universe of all texts to a small set of prototypical types of texts, then the theory is of little explanatory value. However, a substantial body of data have already been reported in support of a general schema for narratives, and the schema has been successfully applied to the analysis of numerous texts. It is not unreasonable to suppose that other general schemata for text organization could be identified and tested in a similar manner.

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